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09/964,927

17 June 2003

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Daniel Petkovsek, Patent Examiner
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Fax: (703) 872-9318

Dear Mr. Petkovsek,

This letter is to itemize and clarify the questions I have regarding your recent office action. I appreciate your efforts thus far, and have no wish to impose unduly on your time, so my intent is to fax you the questions and then call you to discuss them. I've left some space after each question, in case you feel a need to make notes.

Written Query of Wil McCarthy and Gary Snyder to
Office Action dated 09 June 2003
for Patent Application/Control Number 09/964,927
Art Unit: 2874
Examiner: Daniel J. Petkovsek

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7/14/03
ju**Priority**

The office action summary states that:

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. 119(e) (to a provisional application).

However, the detailed action states that:

The date given with the claim for benefit of provisional application 60/312,264 of August 14, 2001 is not consistent with PTO records.

My filing receipt for the provisional Patent Application numbered 60/312,264 (confirmation number 9366) gives a filing date of 8/14/2001. Therefore, if the claim for priority is acknowledged, what date should we use?

Information Disclosure Statement

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1) The text makes reference to a form PTO-1449, which I have not received. Do I need this?

2) Reference AX is incomplete and does not have a verification of the source document. What is required to remedy this?

Does the late submission of this information change my effective filing date?

3) This is a request to remove Figures 1, 2, 3A, and 3B from the disclosure and place them in the drawing section. However, I received a Formalities Letter (confirmation number 2183) dated 10/30/2001 directing me to remove all drawings or flow diagrams from the specification. I responded with an updated specification in which Figures 1, 2, 3A, and 3B had been removed (not moved to the drawing section). For this I received an Updated Filing Receipt (confirmation number 2183), dated 01/10/2002.

Is the removal of the drawings from the specification and disclosure sufficient, or should I restore them in the drawings section? If I restore them, may I also restore the explanations of them which were previously included in the Background/Prior Art section of the specification?

4,5) Misspellings, mistyped figure numbers in the text, and "I/we" informalities will be corrected.

6) How strict is the preferred layout? Should the outline letters be included with the section titles? Should sections such as "STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT" be included even if there is no relevant information to disclose? For clarity I included a section called "Background -- definitions and theory of operation". Should I delete this section, or move its contents into the prior art section?

In short, how should I reorganize the existing material to make your job easier and maximize my chances of success?

7) If the title "Quantum Dot Fiber" is not descriptive, how about "Fiber Incorporating Quantum Dots as Programmable Dopants", which includes the recommended maximum of 7 words. Alternatively, how about "Programmable Matter Using Fiber-Mounted Quantum Dots" ?

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8) Format corrections will be made involving a period at the end of each claim, semicolons after each limitation, and removal of the word "In" from "In a device/method."

9,10) Regulations noted. Must we disclose the detailed construction and operating principles of a semiconductor-based electrostatic quantum dot, even though (a) that information can be found in the references, and (b) it's not part of what we regard as the invention?

The invention specifically relates to a novel arrangement of quantum dots -- along the surface of a fiber -- for a novel purpose -- to serve as programmable dopants inside a bulk material, for the purpose of changing its apparent or effective composition in real time. What specific areas require additional detail? For example, is it sufficient to state that there is an adjustable voltage between two electrodes? Or should I instead state that one electrode is a source and the other is a drain or signal ground, and that the voltage source is DC? Or should I further state the expected voltages required to operate the device? Or should I state additional specific information about these electrodes, such as their composition and the expected amperage of the current they carry? Should I talk about the movement of individual electrons, or is it sufficient to talk about voltages?

11) Claims 1-8 are rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The claims of the invention of Applicant are vague and indefinite for the independent claims 1 and 7. It is unclear to a person having ordinary skill in the art as to how the device for producing quantum effects, or the method for controlling dopants in the interior of bulk materials, would work. There is no reasonable description in the disclosure or claims for how the device/method is composed, constructed, or functioned. A more full and clear description of the device/method is needed in both the specification and the claims.

I checked a box on my application form asking for assistance in writing one claim. Is this still a possibility? Based on this assistance, I can rewrite my other claims using that one as a model.

12) Indefinite language in claims 1 and 7 refers (vaguely) to elements not actually disclosed, thereby rendering the scope of the claims unascertainable. Must I remove these indefinite statements, or can I replace them with definite statements (e.g., lists) which refer to elements added to the disclosure?

13) Regulation noted. Thanks.

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14) *Claims 1-6 are rejected under 35 USC 102(e) as being anticipated by Fan et. al. USP no. 6,512,242., [which] teaches a device for producing quantum effects comprising: a fiber shaped material 504, energy carried along the fiber with control, and quantum dots (502,503) near the surface of the fiber that hold energy in the control paths. Regarding the whereby statements, these statements are the intended result of the limitations (a)-(c) and are fully met by any reference disclosing (a)-(c).*

Is one limitation of Claim 1 sufficient to distinguish it from Patent 6,512,242, or must all the limitations be distinct?

(a,b) Fan's "fiber shaped material" is specifically and explicitly a quantum wire, whereas the fiber-shaped material of my invention is either a cylindrical quantum well, a continuous wire (either quantum or classical), or an intermittent wire (either quantum or classical). Also, Fan's fibers and control paths are one and the same, i.e., each control path is a separate fiber.

Should Claim 1, limitations (a) and (b) be rewritten to distinguish them from Fan's invention, or is it sufficient to distinguish only limitation (c)?

(c) Fan's quantum dots are located externally to the fiber, not on or beneath its surface, as in my invention. If (c) were rewritten to say "on or beneath the surface of the fiber rather than "on or near the surface of the fiber", would that suffice to distinguish it from Fan's invention ?

Furthermore, and perhaps more crucially, Fan's quantum dots are intended to serve as "resonant coupling elements" rather than as artificial atoms. Patent 6,512,242 refers to artificial atoms only in the title of one of its references: R.C. Ashoori, "Electrons in Artificial Atoms", Nature, Vol. 379, pp. 413-9 (1996), and does not mention them at all in the abstract, drawings, claims, background, or summary. Clearly, the control of embedded, programmable dopant atoms is not the intended result of Fan et. al.'s claims or invention. Isn't this, by itself, sufficient to distinguish Claim 1, limitation (c) from Patent 6,512,242, so long as the distinction is spelled out in the prior art section of the specification? If not, what changes to (c) are required to distinguish it?

More generally, would it be better to have separate claims for each embodiment of the device, so that each claim could be more specific? Would this undermine the breadth of the patent?

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15) Claims 7 and 8 are rejected under 35 USC 102(e) as being anticipated by Stinz et. al. [which] teaches a way of controlling dopants in a bulk substrate comprising: confining charges with carriers having quantum wavelike properties (dots/dashes, Fig 12B) the inherently are smaller (since quantum) than the de Broglie wavelength, and carrying energies (usefulness with gain properties) while imbedded in the solid material. Regarding the whereby statements, these statements are the intended result of limitations (a)-(b), and are fully met by any reference disclosing (a)-(b). Regarding Claim 8, quantum dot particles are used.

In the first place, patent application 09/961,560 was filed on September 20, 2001, based on provisional patent applications 60/234,344 filed September 22, 2000, 60/252,804 filed November 21, 2000, 60/276,186 filed March 16, 2001, and 60/272,307 filed on Mar 2, 2001. Conversely, our patent application was filed September 26, 2001 based on provisional patent application 60/312,264 filed August 14, 2001. Therefore, it seems plausible that the substance of our 14 August claims predate the final claims made by Stinz et. al. on September 20 of the same year. In particular, the terms "artificial atom", and "programmable matter" do not appear in any of Stinz. et. al's publications. Indeed, the words "programmable" and "artificial" do not appear, although "tunable" does, though in reference to laser frequencies rather than artificial atoms. While the words "doping" and "dopant" appear frequently, they are in reference to normal atomic dopants rather than the use of quantum dots as dopants, much less their use as programmable dopants. The goal of embedding programmable dopant atoms is clearly not the intended result of Stinz. et. al's claims or invention. Isn't this, by itself, sufficient to distinguish my Claim 7 from Application Number 09/961,560, so long as the distinction is spelled out in the prior art section of the specification? If not, what sorts of changes need to be made to the claim to distinguish it?

More specifically, the "atom-like" properties of Stinz's quantum dashes are referred to only once, and only in terms of their optical characteristics: "*an ensemble of uniformly sized quantum dashes that functioned as ideal quantum dots would have an atomic-like density of states and optical gain.*" Their use as generalized dopants is not explored or claimed. Furthermore, while the patent application describes "substantial control over the available quantum states," this control is achieved only and exclusively at the time of manufacture, by growing the quantum dashes "*with a variety of length-to-width-to-height ratios, for example, by adjusting the InAs monolayer coverage, growth rate, and growth temperature.*" The tuning of laser frequencies is not accomplished by changing the doping characteristics of the quantum dashes, but by "*wavelength selective feedback,*" using an external optical grating to limit the input frequencies which can reach them. Conversely, the size, shape, and atomic number of the programmable dopant atoms in my invention can be adjusted directly, in real-time, well after the manufacture of the device.

In Claim 7, would it be sufficient to replace "controlling dopants in the interior of bulk materials" with "controlling materials in real time, in the interior of bulk materials" and add a third limitation, "(c) controlling said energy so that 'artificial atoms' are formed in the confinement region, whose properties can be adjusted in real time." ??

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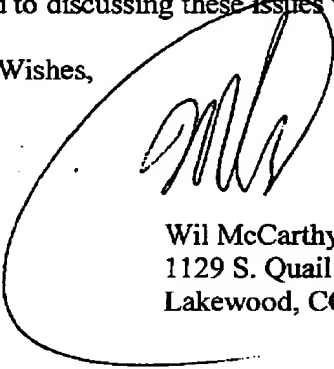
16) *The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, with respect to the state of the art of quantum dots with inline-type devices.*

Do you recommend echoing or paraphrasing the pertinent sections of these documents in the Background section of my application?

On a final note, should I address my updated specification and drawings to you personally, or to the Commissioner for Patents?

That's all I have. I look forward to discussing these issues with you at your earliest convenience.

All Best Wishes,



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